Nutrient Workgroup – December 15, 2011

Goals

- Establish permit limits to ensure that the water quality standard is met
  - Magnitude, duration, and frequency
- MPDES rules (NPDES 40 CFR 122.44)
  - Account for the variability of the effluent
- Tools in the toolbox
  - Data available and impacts to all sized systems
  - Resources available – staff, time, costs

Example 1 – Reasonable Potential

- Major Wastewater Treatment Facility
  - Zero Dilution
  - Receiving Water 14Q10 = 0

Maximum Reported Total N Concentration	Total N numeric standard in µg/L	Total N numeric standard in mg/L
14.04 mg/L	300 µg/L	0.3 mg/L

Maximum Reported Total P Concentration	Total P numeric standard in µg/L	Total P numeric standard in mg/L
0.38 mg/L	25 µg/L	0.025 mg/L

Example 1 – Permit Limits

- Waste Load Allocation (WLA)
  - Effluent quality that is necessary to meet water quality standards of the receiving water
  - Remember 14Q10 = 0
    - The water quality standard is used as the WLA

LTA = WLA x Table Multiplier

Example 1 – LTA

LTA = WLA x Table Multiplier

LTA = 300 µg/L x 0.853 = 256 µg/L (CV=0.2)

LTA = 300 µg/L x 0.644 = 193 µg/L (CV=0.6)

Example 1 – AML

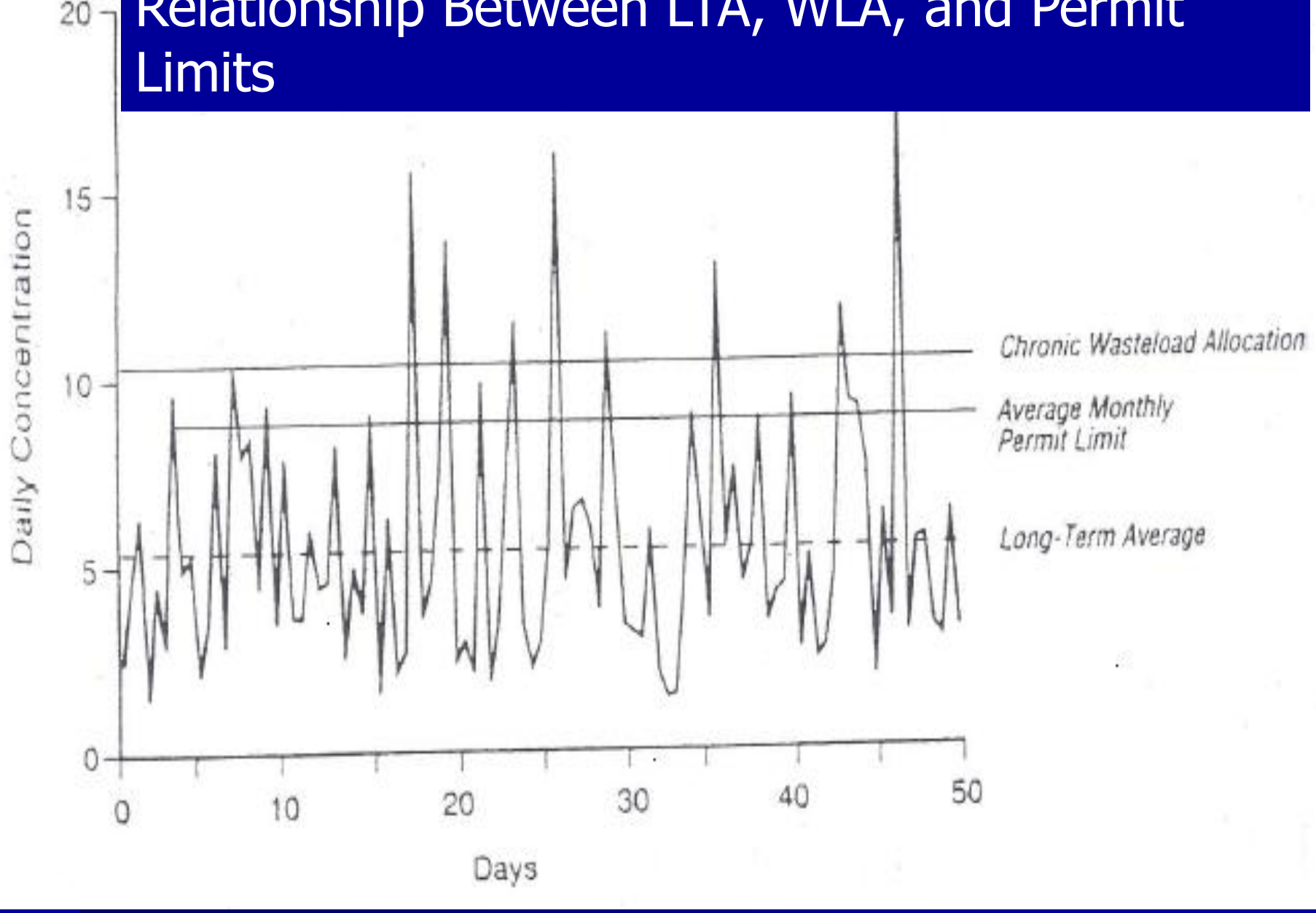
AML = LTA x Table Multiplier

AML= 256 µg/L x 1.17 = 300 µg/L (CV=0.2; n =4)

AML = 193 µg/L x 1.55 = 299 µg/L (CV=0.6;n =4)*

Permit Limits - effective July – September only				
Parameter	AML µg/L	AML mg/L	AWL	Max Daily
TN	299	0.299	----------	----------
TP	24.95	0.025	----------	----------

Relationship Between LTA, WLA, and Permit Limits



Example 2 – Reasonable Potential

- Minor Wastewater Treatment Facility
  - 50:1 dilution
  - Receiving Water 14Q10 = 91.1 mgd

$$RWC = Q_dC_d + Q_sC_s/Q_r$$

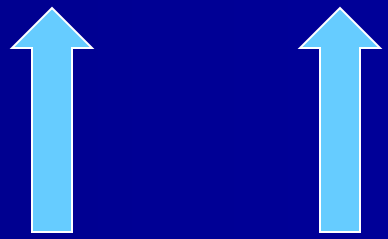
RWC = Projected maximum receiving water concentration
Qd = Effluent Flow rate
Cd = Estimated maximum effluent concentration based on CV of the data
Qs = Receiving stream 14Q10
Cs = Instream background concentration (100 µg/L – N; 5 µg/L – P)
Qr = 14Q10 + Effluent flow rate

Example 2 – Reasonable Potential

- Major Wastewater Treatment Facility

	Maximum Concentration	Effluent Flow Rate	Receiving Water 14Q10	Projected Max Receiving Water	Proposed Numeric Standard
TN	15.9/21 mg/L	1.984 mgd	91.1 mgd	545 µg/L	300 µg/L
TP	9.6/12.5 mg/L			270 µg/L	25 µg/L

Projected Receiving Water Exceeds the proposed numeric standard = Reasonable Potential Exists and Effluent Limits are Necessary



Example 2 – WLA

	Proposed Numeric Standard	Effluent Flow Rate	Receiving Water 14Q10	Instream Background Concentration	WLA µg/L	WLA mg/L
TN	300 µg/L	1.984 mgd	91.1 mgd	100 µg/L	9,483 µg/L	9.483 mg/L
TP	25 µg/L			5 µg/L	944 µg/L	0.944 mg/L

Example 2 – AML

Permit Limits - effective July – September only				
Parameter	AML µg/L	AML mg/L	AWL	Max Daily
TN	9,469	9.469	----------	----------
TP	942	0.942	----------	----------

Compare Example 1 and 2

Example 1:
Major WWTP
Zero 14Q10

Permit Limits - effective July – September only		
Parameter	AML µg/L	AML mg/L
TN	299	0.299
TP	24.95	0.02495

Example 2:
Minor WWTP
50:1 91.1mgd 14Q10

Permit Limits - effective July – September only		
Parameter	AML µg/L	AML mg/L
TN	9,469	9.469
TP	942	0.942

Variance

- Based on Draft DEQ-12
  - Version 5.4 and generally follows the EPA Technical Support Document
    - Part B, Section 2.0 --- 30-day average monthly limit using a Long Term Average

Variance Examples

TOTAL NITROGEN

CV	No. Samples	TSD Multiplier	AML (µg/L) based on 10,000 µg/L LTA	AML (µg/L) based on 15,000 µg/L LTA
0.1	4	1.08	10,800	16,200
	2	1.12	11,200	16,800
	1	1.17	11,700	17,550
0.6	4	1.55	15,500	23,250
	2	1.80	18,000	27,000
	1	2.13	21,300	31,950

Permit – Example 1

- Water Quality Standard – 20 years

Permit Limits - effective July – September only		
Parameter	AML µg/L	AML mg/L
TN	299	0.299
TP	24.95	0.02495

- Variance – General Variance Granted

Interim Permit Limits - Variance effective July – September only		
Parameter	AML (µg/L) based on 10,000 µg/L LTA	AML mg/L
TN	15,500	15.5
TP	1,550	1.55

Permit Requirements

- First Renewed – 5 year
  - Optimization Study
    - Evaluate Current Facility Operations
    - Within two years of receiving general variance
      - Draft DEQ-12 Part B, 2.1
  - Compliance with Variance and Progress Towards Numeric Nutrient Standards

Next Permit

- Second Renewal – 5 -10 year from variance
  - General Variance Numbers Lowered?
    - Conceptual Options 1 or 2

Yes – Interim and New Final Permit Cycle with Compliance Plan to achieve General Variance

- apply individual?
- meet numeric nutrient standards?

No – Compliance with Variance and Progress Towards Numeric Nutrient Standards

Summary/Questions

- Proposed DEQ-12
- Standard is in concentration
- Long Term Average
- Average Monthly Limit – 30-day average
- Period of Application – Ecoregion
  - Seasonal
  - Year-round